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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application Serial No.....10/695,961
Filing Date.....October 27, 2003
Inventor.....Terry L. Gilton
Assignee.....Micron Technology, Inc.
Group Art Unit.....2815
Examiner.....Matthew C. Landau
Attorney Docket No.....MI22-2428
Title: Switchable Circuit Devices

Commissioner for Patents
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Dated: Jan. 27, 2005

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FEE DEFICIENCY

Although it is believed that no fees are due, the Commissioner is hereby authorized to charge any fees under 37 C.F.R. 1.16 and 1.17 which may be required by this paper to Deposit Account No. 23-0925.

Dated: 1/27/05

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Application Serial No.10/695,961
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Inventor..... Terry L. Gilton
Assignee.....Micron Technology, Inc.
Group Art Unit.....2815
ExaminerMatthew C. Landau
Attorney's Docket No.MI22-2428
Customer No.021567
Title: Switchable Circuit Devices

RESPONSE TO NOVEMBER 9, 2004 OFFICE ACTION

To: Commissioner for Patents
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Alexandria, VA 22313-1450

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AMENDMENTS

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In the Specification

No changes.

In the Claims

Claims 1-60 (canceled).

Claim 61 (currently amended): A semiconductor construction, comprising:

- a semiconductor substrate;
- an insulative material over the semiconductor substrate;
- trenches extending within the insulative material;
- a first conductive wiring layer within the trenches and partially filling the trenches, the first conductive wiring layer comprising n-type conductively-doped silicon;
- porous silicon over and directly against the n-type conductively-doped silicon of the first conductive wiring layer within the trenches, the porous silicon being p-type doped;
- an active molecular switchable memory material within pores of the p-type doped porous silicon, the active molecular switchable memory material being selected from a group consisting of redox-active catenane, redox-active rotaxane, redox-active pseudorotaxane, and mixtures thereof; and
- a second conductive wiring layer over and directly against the p-type doped porous silicon and active molecular switchable memory material therein.

Claim 62 (original): The switchable circuit device of claim 61 wherein the active molecular switchable memory material comprises two stable states which are interchanged by oxidation and reduction of the material.

Claim 63 (currently amended): The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active catenane.

Claim 64 (currently amended): The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active rotaxane.

Claim 65 (currently amended): The semiconductor construction of claim 61 wherein the active molecular switchable memory material comprises a redox-active pseudorotaxane.

Claims 66 and 67 (cancelled).

Claim 68 (currently amended): The semiconductor construction of claim 61 wherein the ~~first and second conductive wiring layers comprise~~ layer comprises conductively doped silicon.

Claim 69 (original): The semiconductor construction of claim 61 wherein the first conductive wiring layer defines lines extending primarily along a first direction; and wherein the second conductive wiring layer is formed in a shape of a line extending primarily along a second direction substantially perpendicular to the first direction.

REMARKS

Claims 1-60, 66 and 67 are cancelled; claims 61 and 63-65 are amended; and claims 61-65 and 69 are pending in the application.

The pending claims stand rejected as being unpatentable over Schultze, Heath and Ovshinsky, in various combinations. Applicant has amended claim 61, from which the remaining claims depend, and believes that such amendments place all of the claims in condition for allowance.

Amended claim 61 recites a semiconductor construction comprising a semiconductor substrate, an insulative material over the substrate, and trenches extending within the insulative material. The claim further recites that a first conductive wiring layer and porous silicon are within the trenches, with the porous silicon being over and directly against the first conductive wiring layer. Additionally, the amended claim recites that the porous silicon is p-type doped, the first conductive wiring layer comprises n-type conductively-doped silicon, and the p-type doped porous silicon is over and directly against the n-type doped conductively-doped silicon of the first conductive wiring layer. Additionally, the amended claim recites that there is an active molecular switchable memory material within pores of the p-type doped porous silicon, with such active molecular switchable material being selected from a group consisting of redox-active catenane, redox-active rotaxane, redox-active pseudorotaxane, and mixtures thereof. Finally, the amended claim recites that a second conductive wiring layer is over and directly against the p-type doped porous silicon and active molecular switchable memory material therein.

The amendments to claim 61 reciting the p-type doped porous silicon and n-type conductively-doped silicon are supported by the originally-filed application at, for example, paragraphs 0027 and 0029, and therefore do not comprise "new matter". The other amendments to the claim are supported either by the originally-filed claims (claims 63-65) or by the originally-filed drawings (for example Fig. 6), and therefore also do not comprise "new matter".

Amended claim 61 is believed allowable over the cited references for at least the reason that the references do not suggest or disclose all of the recited features of claim 61.

For instance, the references do not suggest or disclose the recited p-type doped porous silicon and n-type conductively doped silicon, in direct contact with one another, and both being within trenches in an insulative material. For at least this reason, claim 61 is allowable over the cited references. The claim is further allowable in that the references do not suggest such recited features of claim 61 in combination with the claim 61 recited active molecular switchable memory material selected from a group consisting of redox-active catenane, redox-active rotaxane, redox-active pseudorotaxane, and mixtures thereof, within the pores of the p-type doped porous silicon, nor do the references suggest or disclose the recited second conductive wiring layer over and directly against the recited p-type doped porous silicon and active molecular switchable memory material therein.

The Examiner cites Schultze for allegedly showing that an active molecular switchable memory material was known in the art to be formed within porous silicon, cites Heath for allegedly showing that redox-active catenanes, redox-active rotaxanes, and redox-active pseudorotaxanes were known in the art to be molecular switchable memory

materials; and cites Ovshinsky for allegedly showing that it was known in the art to form active molecular switchable material between a pair of electrodes. Applicant respectfully submits, however, that not one of the Examiner's cited references suggests or discloses the amended claim 61 recited feature of a wiring layer comprising n-type conductively-doped silicon in a trench with p-type doped porous silicon also in the trench and directly against the n-type conductively-doped silicon, together with the recited active molecular switchable memory material being within pores of the p-type doped porous silicon. Such recited aspect of claim 61 is not only not found within any one of the Examiner's cited references, but also is not suggested by any combination of features amongst the cited references. Claim 61 is therefore allowable over the cited references, and Applicant respectfully requests such allowance in the Examiner's next action.

Claims 62-65, 68 and 69 depend from claim 61, and are therefore allowable for at least the reasons discussed above regarding claim 61.

Pending claims 61-65, 68 and 69 are allowable for the reasons discussed above, and Applicant therefore respectfully requests that the Examiner's next action be a Notice of Allowance.

Dated: 1/27/05

Respectfully submitted,

By: David G. Latwesen, Ph.D.

Reg. No. 38,533